# Project Note

| Date: January 8, 2008 | Project Number: TTEMI-05-003-0019 |
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Title: Environmental Scientist

Signature: *Shanna Davis*

Subject: Summary of J-Qualified Data

## PROJECT NOTE SUMMARY

The analytical results presented in the table in the following pages are for samples collected at the Barite Hill property in McCormick, McCormick County, South Carolina. The samples were collected by South Carolina Department of Health and Environmental Control (SCDHEC) during the 2004 preliminary assessment/site investigation (PA/SI), by Response Engineering and Analytical Contract (REAC) during the 2007 removal site evaluation (RSE), and by Tetra Tech during the 2007 expanded site inspection (ESI).

The samples collected by SCDHEC during the 2004 PA/SI were analyzed by the Environmental Protection Agency (EPA) Region 4 Science and Ecosystem Support Division (SESD). Data validation was conducted by EPA Region 4 SESD.

The samples collected by REAC during the 2007 RSE as well as the samples collected by Tetra Tech during the 2007 ESI were analyzed under the EPA Contract Laboratory Program. Data validation for both sampling events was conducted by EPA Region 4 SESD.

The explanations used to determine the bias direction for the "J"-flagged estimated analytical results are presented in Reference 61.

All "J"-flagged estimated data for the PA/SI, RSE, and ESI were adjusted according to guidance presented in the EPA fact sheet "Using Qualified Data to Document an Observed Release and Observed Contamination" dated November 1996 (Ref. 62).

The determination of the bias direction was obtained form the EPA Region 4, SESD, Office of Quality Assurance.

A Tetra Tech chemist provided the bias directions for the following data qualifiers.

Project Number 07-0512: Performance evaluation (PE) sample recovery greater than control limits – The recovery of the known amount spiked into the PE sample was greater than the control limits; therefore, the instrument is reading more analyte in the sample than is known to be present. High bias is indicated (see Ref. 40, Appendix E, pp. 1 of 160, 3 of 160).

Project Number 07-0377: PE sample recovery outside warning limits – The recovery of the known amount spiked into the PE sample was greater than the control limits; therefore, the instrument is reading more analyte in the sample than is known to be present. High bias is indicated (see Ref. 56, pp. 1, 3).

Result greater than the method detection limit (MDL) but less than the method reporting limit (MRL) – The result was detected, but at a level below the MRL established from the confidence level stated in the analytical method. Therefore, the value reported is imprecise and may be higher or lower than the result reported. Bias is unknown.

## RESPONSE REQUIRED

( x ) None    ( ) Phone call    ( ) Memo    ( ) Letter    ( ) Report

cc:        File ( x )        Project Manager ( )        Principal Investigator ( )        Other (specify)

**TETRA TECH**

| Investigation | Sample ID/Type of Sample | Sample Media | Hazardous Substance | Concentration | Bias Type | Calculation and Concentration (mg/kg) |
|---|---|---|---|---|---|---|
| RSE | BH-247-7 Background | Sediment | Copper | 30J | Matrix spike recovery less than 10% - Low Bias<br><br>PE sample recovery outside warning limits – High Bias (see page 1 of this project note)<br><br>Low bias is applied to be conservative<br><br>Refs. 56, pp. 2, 3, 8, 73; 61, p. 2; 62, pp. 8, 18; 63, p. 20 | 30 × 1.22 = 36.60 |
| RSE | BH-247-7 Background | Sediment | Zinc | 47J | Serial dilution precision outside method control limits = 19% Unknown Bias<br><br>Ref. 56, pp. 3, 8, 73; 61, p. 1; 62, pp. 8, 18; 63, p. 20 | 47J × 1.5 = 70.50 |
| RSE | BH247-6 Release | Sediment | Copper | 300J | Matrix spike recovery less than 10% - Low Bias<br><br>PE sample recovery outside warning limits – High Bias (see page 1 of this project note)<br><br>High bias is applied to be conservative<br><br>Refs. 56, pp. 2, 3, 8, 71; 61, p. 2; 62, pp. 8, 18; 63, p. 20 | 300 ÷ 1.22 = 245.90 |
| RSE | BH247-8 Release | Sediment | Copper | 540J | PE sample recovery outside warning limits<br><br>High Bias (see page 1 of this project note)<br><br>Refs. 56, pp. 3, 8, 75; 62, pp. 8, 18; 63, p. 22 | 540 ÷ 1.22 = 442.62 |

**TETRA TECH**

| Investigation | Sample ID/Type of Sample | Sample Media | Hazardous Substance | Concentration | Bias Type | Calculation and Concentration (mg/kg) |
|---|---|---|---|---|---|---|
| RSE | BH247-13 Release | Sediment | Copper | 3,700J | Matrix spike recovery less than 10% - Low Bias<br><br>PE sample recovery outside warning limits – High Bias (see page 1 of this project note)<br><br>High bias is applied to be conservative<br><br>Refs. 56, pp. 2, 3, 8, 37; 61, p. 2; 62, pp. 8, 18; 63, p. 18 | 3,700 ÷ 1.22 = 3,032.79 |
| RSE | BH247-13 Release | Sediment | Zinc | 1,300J | Serial dilution precision outside method control limits = 19% Unknown Bias<br><br>Ref. 56, pp. 3, 8, 37; 61, p. 1; 62, pp. 8, 18; 63, p. 18 | 1,300J ÷ 1.5 = 866.67 |
| RSE | BH247-19 Release | Sediment | Copper | 300J | Matrix spike recovery less than 10% - Low Bias<br><br>PE sample recovery outside warning limits – High Bias (see page 1 of this project note)<br><br>High bias is applied to be conservative<br><br>Refs. 56, pp. 2, 3, 8, 43; 61, p. 2; 62, pp. 8, 18; 63, p. 18 | 300 ÷ 1.22 = 245.90 |
| RSE | BH247-25 Release | Sediment | Copper | 180J | Matrix spike recovery less than 10% - Low Bias<br><br>PE sample recovery outside warning limits – High Bias (see page 1 of this project note)<br><br>High bias is applied to be conservative<br><br>Refs. 56, pp. 2, 3, 8, 51; 61, p. 2; 62, pp. 8, 18; 63, p. 19 | 180 ÷ 1.22 = 147.54 |

**TETRA TECH**

| Investigation | Sample ID/Type of Sample | Sample Media | Hazardous Substance | Concentration | Bias Type | Calculation and Concentration (mg/kg) |
|---|---|---|---|---|---|---|
| RSE | BH247-525 Release | Sediment | Copper | 200J | Matrix spike recovery less than 10% - Low Bias<br><br>PE sample recovery outside warning limits – High Bias (see page 1 of this project note)<br><br>High bias is applied to be conservative<br><br>Refs. 56, pp. 2, 3, 8, 67; 61, p. 2; 62, pp. 8, 18; 63, p. 20 | 200 ÷ 1.22 = 163.93 |
| RSE | BH247-27 Release | Sediment | Copper | 220J | Matrix spike recovery less than 10% - Low Bias<br><br>PE sample recovery outside warning limits – High Bias (see page 1 of this project note)<br><br>High bias is applied to be conservative<br><br>Refs. 56, pp. 2, 3, 8, 55; 61, p. 2; 62, pp. 8, 18; 63, p. 19 | 220 ÷ 1.22 = 180.33 |
| ESI | BH-SD-01 Background | Sediment | Copper | 160J | PE sample recovery greater than control limits<br><br>High Bias (see page 1 of this project note)<br><br>No adjustment needed<br><br>Refs. 40, Appendix E, pp. 3 of 160, 8 of 160, and 12 of 160; 62, p. 8 | 160 |

| Investigation | Sample ID/Type of Sample | Sample Media | Hazardous Substance | Concentration | Bias Type | Calculation and Concentration (mg/kg) |
|---|---|---|---|---|---|---|
| ESI | BH-SD-02 Background | Sediment | Copper | 29J | PE sample recovery greater than control limits<br><br>High Bias (see page 1 of this project note)<br><br>No adjustment needed<br><br>Refs. 40, Appendix E, pp. 3 of 160, 8 of 160, and 14 of 160; 62, p. 8 | 29 |
| ESI | BH-SD-03 Background | Sediment | Lead | 14J | Matrix spike recovery less than method control limits = 39% - Low Bias<br><br>Serial dilution precision outside method control limits = 15% - Unknown Bias<br><br>Refs. 40, Appendix E, pp. 2 of 160, 8 of 160, 16 of 160; 61, pp. 1, 2; 62, pp. 8, 18; 63, p. 3 | $14 \times 1.44 = 20.16$ |
| ESI | BH-SD-03 Background | Sediment | Nickel | 8.5J | Result greater than MDL but less than MRL<br><br>Unknown Bias (see page 1 of this project note)<br><br>Ref. 40, Appendix E, pp. 8 of 160, 16 of 160; 61, p. 1; 62, pp. 8, 18 | $8.5 \times 1.35 = 11.48$ |
| ESI | BH-SD-03 Background | Sediment | Zinc | 54J | Serial dilution precision outside method control limits = 34%<br><br>Unknown Bias<br><br>Ref. 40, Appendix E, pp. 3 of 160, 8 of 160, 16 of 160; 61, p. 1; 62, pp. 8, 18; 63, p. 3 | $54 \times 1.50 = 81$ |

| Investigation | Sample ID/Type of Sample | Sample Media | Hazardous Substance | Concentration | Bias Type | Calculation and Concentration (mg/kg) |
|---|---|---|---|---|---|---|
| ESI | BH-SD-08 Background | Sediment | Copper | 19J | PE sample recovery greater than control limits<br><br>High Bias (see page 1 of this project note)<br><br>No adjustment needed<br><br>Ref. 40, Appendix E, pp. 3 of 160, 8 of 160, 26 of 160; 62, p. 8 | 19 |
| ESI | BH-SD-08 Background | Sediment | Lead | 29J | Matrix spike recovery less than method control limits = 39% - Low Bias<br><br>Serial dilution precision outside method control limits = 15% - Unknown Bias<br><br>Refs. 40, Appendix E, pp. 2 of 160, 8 of 160, 26 of 160; 61, pp. 1, 2; 62, pp. 8, 18; 63, p. 3 | $29 \times 1.44 = 41.76$ |
| ESI | BH-SD-08 Background | Sediment | Nickel | 8.9J | Result greater than MDL but less than MRL<br><br>Unknown Bias (see page 1 of this project note)<br><br>Ref. 40, Appendix E, pp. 8 of 160, 26 of 160; 61, p. 1; 62, pp. 8, 18 | $8.9 \times 1.35 = 12.02$ |
| ESI | BH-SD-08 Background | Sediment | Zinc | 53J | Serial dilution precision outside method control limits = 34%<br><br>Unknown Bias<br><br>Ref. 40, Appendix E, pp. 3 of 160, 8 of 160, 26 of 160; 61, p. 1; 62, pp. 8, 18; 63, p. 3 | $53 \times 1.5 = 79.5$ |

TETRA TECH

| Investigation | Sample ID/Type of Sample | Sample Media | Hazardous Substance | Concentration | Bias Type | Calculation and Concentration (mg/kg) |
|---|---|---|---|---|---|---|
| ESI | BH-SD-05 Release | Sediment | Copper | 810J | PE sample recovery greater than control limits<br><br>High Bias (see page 1 of this project note)<br><br>Ref. 40, Appendix E, pp. 3 of 160, 8 of 160, 20 of 160; 62, pp. 8, 18 | $810 \div 1.22 =$ 663.93 |
| ESI | BH-SD-07 Release | Sediment | Copper | 1,100J | PE sample recovery greater than control limits<br><br>High Bias (see page 1 of this project note)<br><br>Ref. 40, Appendix E, pp. 3 of 160, 8 of 160, 24 of 160; 62, pp. 8, 18 | $1,100 \div 1.22 =$ 901.64 |
| ESI | BH-SD-11 Release | Sediment | Copper | 670J | PE sample recovery greater than control limits<br><br>High Bias (see page 1 of this project note)<br><br>Ref. 40, Appendix E, pp. 3 of 160, 8 of 160, 34 of 160; 62, pp. 8, 18; 63, p. 4 | $670 \div 1.22 =$ 549.18 |
| ESI | BH-SD-11 Release | Sediment | Lead | 220J | Matrix spike recovery less than method control limits = 39% - Low Bias<br><br>Serial dilution precision outside method control limits = 15% - Unknown Bias<br><br>Unknown bias is applied to be conservative<br><br>Refs. 40, Appendix E, pp. 2 of 160, 8 of 160, 34 of 160; 61, pp. 1, 2; 62, pp. 8, 18; 63, p. 4 | $220 \div 1.44 =$ 152.78 |

**TETRA TECH**

| Investigation | Sample ID/Type of Sample | Sample Media | Hazardous Substance | Concentration | Bias Type | Calculation and Concentration (mg/kg) |
|---|---|---|---|---|---|---|
| ESI | BH-SD-12 Release | Sediment | Copper | 950J | PE sample recovery greater than control limits<br><br>High Bias (see page 1 of this project note)<br><br>Ref. 40, Appendix E, pp. 3 of 160, 8 of 160, 36 of 160; 62, pp. 8, 18 | $950 \div 1.22 =$ 778.69 |
| ESI | BH-SD-12 Release | Sediment | Lead | 210J | Matrix spike recovery less than method control limits = 39% - Low Bias<br><br>Serial dilution precision outside method control limits = 15% - Unknown Bias<br><br>Unknown bias is applied to be conservative<br><br>Refs. 40, Appendix E, pp. 2 of 160, 8 of 160, 36 of 160; 61, pp. 1, 2; 62, pp. 8, 18; 63, p. 4 | $210 \div 1.44 =$ 145.83 |
| ESI | BH-SD-12 Release | Sediment | Zinc | 1,300J | Serial dilution precision outside method control limits = 34%<br><br>Unknown Bias<br><br>Ref. 40, Appendix E, pp. 3 of 160, 8 of 160, 36 of 160; 61, p. 1; 62, pp. 8, 18; 63, p. 4 | $1,300 \div 1.5 =$ 866.67 |
| ESI | BH-SD-13 Release | Sediment | Copper | 1,400J | PE sample recovery greater than control limits<br><br>High Bias (see page 1 of this project note)<br><br>Ref. 40, Appendix E, pp. 3 of 160, 8 of 160, 38 of 160; 62, pp. 8, 18 | $1,400 \div 1.22 =$ 1,147.54 |

TETRA TECH

| Investigation | Sample ID/Type of Sample | Sample Media | Hazardous Substance | Concentration | Bias Type | Calculation and Concentration (mg/kg) |
|---|---|---|---|---|---|---|
| ESI | BH-SD-13 Release | Sediment | Lead | 240J | Matrix spike recovery less than method control limits = 39% - Low Bias<br><br>Serial dilution precision outside method control limits = 15% - Unknown Bias<br><br>Unknown bias is applied to be conservative<br><br>Refs. 40, Appendix E, pp. 2 of 160, 8 of 160, 38 of 160; 61, pp. 1, 2; 62, pp. 8, 18; 63, p. 4 | 240 ÷ 1.44 = 166.67 |
| ESI | BH-SD-13 Release | Sediment | Nickel | 90J | Result greater than MDL but less than MRL<br><br>Unknown Bias (see page 1 of this project note)<br><br>Ref. 40, Appendix E, pp. 8 of 160, 38 of 160; 61, p. 1; 62, pp. 8, 18 | 90 ÷ 1.35 = 66.67 |
| ESI | BH-SD-13 Release | Sediment | Zinc | 640J | Serial dilution precision outside method control limits = 34%<br><br>Unknown Bias<br><br>Ref. 40, Appendix E, pp. 3 of 160, 8 of 160, 38 of 160; 61, p. 1; 62, pp. 8, 18; 63, p. 4 | 640 ÷ 1.5 = 426.67 |
| ESI | BH-SD-14 Release | Sediment | Copper | 220J | PE sample recovery greater than control limits<br><br>High Bias (see page 1 of this project note)<br><br>Ref. 40, Appendix E, pp. 3 of 160, 8 of 160, 40 of 160; 62, pp. 8, 18 | 220 ÷ 1.22 = 180.33 |

TETRA TECH

| Investigation | Sample ID/Type of Sample | Sample Media | Hazardous Substance | Concentration | Bias Type | Calculation and Concentration (mg/kg) |
|---|---|---|---|---|---|---|
| ESI | BH-SD-15 Release | Sediment | Copper | 340J | PE sample recovery greater than control limits<br><br>High Bias (see page 1 of this project note)<br><br>Ref. 40, Appendix E, pp. 3 of 160, 8 of 160, 42 of 160; 62, pp. 8, 18 | $340 \div 1.22 = 278.69$ |
| ESI | BH-SD-15 Release | Sediment | Lead | 270J | Matrix spike recovery less than method control limits = 39% - Low Bias<br><br>Serial dilution precision outside method control limits = 15% - Unknown Bias<br><br>Unknown bias is applied to be conservative<br><br>Refs. 40, Appendix E, pp. 2 of 160, 8 of 160, 42 of 160; 61, pp. 1, 2; 62, pp. 8, 18; 63, p. 4 | $270 \div 1.44 = 187.50$ |
| ESI | BH-SD-16 Release | Sediment | Copper | 3,200J | PE sample recovery greater than control limits<br><br>High Bias (see page 1 of this project note)<br><br>Ref. 40, Appendix E, pp. 3 of 160, 8 of 160, 44 of 160; 62, pp. 8, 18 | $3{,}200 \div 1.22 = 2{,}622.95$ |
| ESI | BH-SD-17 Release | Sediment | Copper | 5,900J | PE sample recovery greater than control limits<br><br>High Bias (see page 1 of this project note)<br><br>Ref. 40, Appendix E, pp. 3 of 160, 8 of 160, 46 of 160; 62, pp. 8, 18 | $5{,}900 \div 1.22 = 4{,}836.07$ |

| Investigation | Sample ID/Type of Sample | Sample Media | Hazardous Substance | Concentration | Bias Type | Calculation and Concentration (mg/kg) |
|---|---|---|---|---|---|---|
| PA/SI | BH-019-SO | Soil | Arsenic | 39AJ | Matrix precision outside method acceptance criteria<br><br>Matrix spike precision outside guidance levels<br><br>To be conservative an unknown bias is assumed<br><br>Ref. 50, p. 66; 62, pp. 8, 18 | $39 \div 1.74 = 22.41$ |
| PA/SI | BH-019-SO | Soil | Copper | 96AJ | Matrix spike precision outside guidance levels<br><br>To be conservative an unknown bias is assumed<br><br>Ref. 50, p. 66; 62, pp. 8, 18 | $96 \div 1.22 = 78.69$ |

Notes:

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|---|---|
| J | Analyte analyzed in replicate. Reported value is average of replicates. |
| ESI | Expanded site inspection (conducted by Tetra Tech in June 2007) |
| ID | Identification |
| J | Identification of analyte is acceptable; reported value is an estimate |
| MDL | Method detection limit |
| MRL | Minimum reporting limit |
| PA/SI | Preliminary assessment/site inspection (conducted by SCDHEC in September 2004) |
| PE | Performance evaluation |
| REAC | Response Engineering and Analytical Contract |
| RSE | Removal site evaluation (conducted by REAC in March 2007) |
| SCDHEC | South Carolina Department of Health and Environmental Control |
| SD | Sediment |

TETRA TECH